

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 02/00506

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: E21B 1/38, B25D 9/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: E21B, B25D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9842481 A1 (RAMROCK OY), 1 October 1998 (01.10.98)  --	1-10
A	US 5002136 A (J.-C. BARTHOMEUF), 26 March 1991 (26.03.91)  --	1-10
A	US 4718500 A (M. MORI), 12 January 1988 (12.01.88)  -----	1-10

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

20 Sept 2002

Date of mailing of the international search report

24 -09- 2002

Name and mailing address of the ISA/

Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer

Christer Bäcknert / MRo  
Telephone No. +46 8 782 25 00

From the INTERNATIONAL BUREAU

## PCT

NOTICE INFORMING THE APPLICANT OF THE  
COMMUNICATION OF THE INTERNATIONAL  
APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:

KOLSTER OY AB  
Iso Roobertinkatu 23  
P.O. Box 148  
FIN-00121 Helsinki  
FINLANDE

30-12-2002

Date of mailing( <i>day/month/year</i> ) 19 December 2002 (19.12.02)		IMPORTANT NOTICE	
Applicant's or agent's file reference 2010642PC/ko			
International application No. PCT/FI02/000506	International filing date( <i>day/month/year</i> ) 11 June 2002 (11.06.02)	Priority date( <i>day/month/year</i> ) 12 June 2001 (12.06.01)	
Applicant SANDVIK TAMROCK OY, et al			

1. Notice is hereby given that the International Bureau has **communicated**, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this notice:

KP, KR, US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:

AE, AG, AL, AM, AP, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EA, EC, EE, EP, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OA, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this notice is a copy of the international application as published by the International Bureau on 19 December 2002 (19.12.02) under No. WO 02/101192.

4. **TIME LIMITS for filing a demand for international preliminary examination and for entry into the national phase**

The applicable time limit for entering the national phase will, **subject to what is said in the following paragraph**, be **30 MONTHS** from the priority date, not only in respect of any elected Office if a demand for international preliminary examination is filed before the expiration of **19 months** from the priority date, but also in respect of any designated Office, in the absence of filing of such demand, where Article 22(1) as modified with effect from 1 April 2002 applies in respect of that designated Office. For further details, see *PCT Gazette* No. 44/2001 of 1 November 2001, pages 19926, 19932 and 19934, as well as the *PCT Newsletter*, October and November 2001 and February 2002 issues.

In practice, **time limits other than the 30-month time limit** will continue to apply, for various periods of time, in respect of certain designated or elected Offices. For **regular updates on the applicable time limits** (20, 21, 30 or 31 months, or other time limit), Office by Office, refer to the *PCT Gazette*, the *PCT Newsletter* and the *PCT Applicant's Guide*, Volume II, National Chapters, all available from WIPO's Internet site, at <http://www.wipo.int/pct/en/index.html>.

For filing a **demand for international preliminary examination**, see the *PCT Applicant's Guide*, Volume I/A, Chapter IX. Only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination (at present, all PCT Contracting States are bound by Chapter II).

It is the applicant's **sole responsibility** to monitor all these time limits.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer  Judith Zahra
Facsimile No.(41-22) 740.14.35	Telephone No.(41-22) 338.91.11

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2010642PC/nu	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/FI02/00506	International filing date (day/month/year) 11.06.2002	Priority date (day/month/year) 12.06.2001
International Patent Classification (IPC) or national classification and IPC <sub>7</sub> E21B 1/38, B25D 9/04		
Applicant Sandvik Tamrock Oy et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  25.11.2002	Date of completion of this report  23.09.2003
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer  Christer Bäcknert / MRO Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1998)

# CORRECTED

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FI02/00506

## I. Basis of the report

## 1. With regard to the elements of the international application:\*

- ☐ the international application as originally filed
- ☒ the description:  
pages 1-10, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☒ the claims:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, as amended (together with any statement) under article 19  
pages \_\_\_\_\_, filed with the demand  
pages 11-13, filed with the letter of 25.06.2003
- ☒ the drawings:  
pages 1-5, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

## 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

## 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheet/fig \_\_\_\_\_

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FI02/00506

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	<u>1-10</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-10</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-10</u>	YES
	Claims		NO

**2. Citations and explanations (Rule 70.7)**

Documents cited in the International Search Report:

D1: WO 9842481 A1

D2: US 5002136 A

D3: US 4718500 A

The cited documents represent the general state of the art. The invention defined in claims 1- 10 is not disclosed by any of these documents.

The cited prior art does not give any indication that would lead a person skilled in the art to the claimed rock drill. Therefore, the claimed invention is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1-10 is novel and is considered to involve an inventive step. The invention is industrially applicable.

## CLAIMS

1. A rock drill comprising  
a frame (11);  
a shank (6) that is arranged in the front section of the drill (1) and  
5 that is axially movable;  
a percussion device (4) having a reciprocating percussion piston  
(10) on the same axis with the shank (6) and arranged to hit the back end of  
the shank (6) to provide impact pulses in drilling equipment to be fastened to  
the shank (6), the percussion piston (10) having an absorber (26) to absorb the  
10 percussion piston (10) impacts that extend to the front side of a designed im-  
pact point; and  
a pulling element (17, 29) that is a sleeve-like piece arranged  
around the shank, the drill (1) having means for exerting a pulling force to the  
pulling element (17, 29) and for moving the pulling element by a pulling force  
15 axially toward the percussion piston (10), the pulling element further having a  
first bearing surface (18) that is arranged to act on a second bearing surface  
(19) on the shank (6) to move the shank by said pulling force to the designed  
impact point,  
**characterized** in that  
20 during rock drilling, a push force is arranged to act on the pulling  
element (17, 29), the push force being stronger than the pulling force exerted  
to the pulling element (17, 29) during drilling; and that  
during rock drilling, due to said push force, the pulling element (17,  
29) is positioned toward the front section of the drill at a predefined distance  
25 from the position corresponding to the impact point of the shank (6).  
2. A rock drill as claimed in claim 1, **characterized** in that at  
the back end of the pulling element (17, 29), there is a pressure surface (17b,  
29b) and that the pressure surface (17b, 29b) is connected to a channel (22)  
for feeding a pressure medium to act on said pressure surface (17b, 29b) to  
30 achieve the push force.  
3. A rock drill as claimed in claim 2, **characterized** in that  
the pulling element (17, 29) and the frame (11) of the drill limit between them a  
circular pressure space (53) that has a pressure surface (17b, 29b).  
4. A rock drill as claimed in claim 3, **characterized** in that  
35 the circular pressure space (53) is sealed with sealings (51, 52) arranged be-  
tween the pulling element (17, 29) and the frame (11) of the drill.

5. A rock drill as claimed in claims 2 to 4, **characterized** in that the pressure medium is a mixture of gas and lubricant used to lubricate the drill.

6. A rock drill as claimed in any one of the preceding claims, **characterized** in that at the front end of the pulling element (17), there is a pressure surface (17a) that is connected to a first channel (21), and that the pressure of a pressure medium is fed from said channel (21) to act on said pressure surface (17a) to achieve a pulling force.

7. A rock drill as claimed in claim 6, **characterized** in that a sleeve-like second pulling piston (23) is arranged coaxially with the pulling element (17), that at the front end of the second pulling piston (23), there is a pressure surface that is connected to a channel (24) for feeding a pressure medium to said pressure surface in order to move the second pulling piston (23) toward the percussion piston (10), and that a pulling force provided by the second pulling piston (23) is stronger than a force having an opposite direction and acting on the pulling element (17), that the circumference of the pulling element (17) has a shoulder (20), on which the second pulling piston (23) is arranged to act for generating a pulling force in order to move the pulling element (17) toward the percussion piston (10), that the movement of the pulling element (17) is restricted by a mechanical surfaces formed in the frame (11), that the movement of the second pulling piston (23) toward the percussion piston (10) is restricted by the shoulder (25) in such a manner that the pulling element (17) is in the rearmost position of the second pulling piston (23) at a distance from the mechanical surfaces limiting the forward movement of the pulling element (17), and that the forward movement of at least the second pulling piston (23) is absorbed by an absorber (28).

8. A rock drill as claimed in any one of claims 1 to 5, **characterized** in that on the front side of the pulling element (29), there are several cylinder spaces (31) parallel to the shank (6), that each cylinder space (31) is equipped with a cylindrical pulling piston (30, 34, 38), and that the pressure of a pressure medium is led from a channel (32, 33, 35) to the front ends of the pulling pistons (30, 34, 38) to move the pulling pistons (30, 34, 38) toward the percussion piston (10) and to provide a pulling force to the pulling element (29).

9. A rock drill as claimed in claim 8, **characterized** in that the cylindrical pulling pistons (34, 38) are divided according to their travel

length into at least two piston groups, and the movement of the pulling pistons (34) having a shorter travel length is limited toward the percussion piston (10), that during rock drilling, the pulling pistons (34) having a shorter travel length are arranged to provide a second force toward the percussion piston (10) that is stronger than the push force acting on the pulling element (29), that the pulling element (29) is during rock drilling supported by means of the pulling pistons (34) having a shorter travel length to be at a distance from the foremost extreme position of the pulling element (29), and that there is an absorber (40) arranged at least to each pulling piston (34) having a shorter travel length for absorbing the forward movement of the pulling piston (34) and the pulling element (29) supported thereby in the foremost extreme position of the pulling pistons (34).

10. A rock drill as claimed in claim 8 or 9, **characterized** in that a pulling pin (39) parallel to the pulling piston (30, 34, 38) is arranged between each pulling piston (30, 34, 38) and the pulling element (29) behind it to transmit a force from the pulling piston (30, 34, 38) to the pulling element (29).



## PCT REQUEST

Original (for SUBMISSION) - printed on 11.06.2002 11:14:06 AM

0	For receiving Office use only	
0-1	International Application No.	PCT/FI02/00506
0-2	International Filing Date	11 JUN 2002 (11-06-2002)
0-3	Name of receiving Office and "PCT International Application"	The Finnish Patent Office PCT International Application
0-4	Form - PCT/RO/101 PCT Request	
0-4-1	Prepared using	PCT-EASY Version 2.92 (updated 01.01.2002)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	National Board of Patents and Registration (Finland) (RO/FI)
0-7	Applicant's or agent's file reference	2010642PC/ko
I	Title of invention	ROCK DRILL
II	Applicant	
II-1	This person is:	applicant only
II-2	Applicant for	all designated States except US
II-4	Name	SANDVIK TAMROCK OY
II-5	Address:	Pihtisulunkatu 9 FIN-33330 Tampere Finland
II-6	State of nationality	FI
II-7	State of residence	FI
III-1	Applicant and/or inventor	
III-1-1	This person is:	applicant and inventor
III-1-2	Applicant for	US only
III-1-4	Name (LAST, First)	MUUTTONEN, Timo
III-1-5	Address:	Omenapolku 13 FIN-37200 Siuro Finland
III-1-6	State of nationality	FI
III-1-7	State of residence	FI

## PCT REQUEST

Original (for SUBMISSION) - printed on 11.06.2002 11:14:06 AM

IV-1	<b>Agent or common representative; or address for correspondence</b> The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
IV-1-1	Name	KOLSTER OY AB
IV-1-2	Address:	Iso Roobertinkatu 23 P.O.Box 148 FIN-00121 Helsinki Finland
IV-1-3	Telephone No.	358 9 618 821
IV-1-4	Facsimile No.	+358 9 602 244
V	<b>Designation of States</b>	
V-1	Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AP: GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW and any other State which is a Contracting State of the Harare Protocol and of the PCT EA: AM AZ BY KG KZ MD RU TJ TM and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR and any other State which is a Contracting State of the European Patent Convention and of the PCT OA: BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG and any other State which is a member State of OAPI and a Contracting State of the PCT
V-2	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AE AG AL AM AT (patent and utility model) AU AZ BA BB BG BR BY BZ CA CH&LI CN CO CR CU CZ (patent and utility model) DE (patent and utility model) DK (patent and utility model) DM DZ EC EE (patent and utility model) ES FI (patent and utility model) GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK (patent and utility model) SL TJ TM TN TR TT TZ UA UG US UZ VN YU ZA ZM ZW

## PCT REQUEST

2010642PC/ko

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<b>V-5</b>	<b>Precautionary Designation Statement</b> In addition to the designations made under items V-1, V-2 and V-3, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except any designation(s) of the State(s) indicated under item V-6 below. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit.	
<b>V-6</b>	<b>Exclusion(s) from precautionary designations</b>	<b>NONE</b>
<b>VI-1</b>	<b>Priority claim of earlier national application</b>	
VI-1-1	Filing date	<b>12 June 2001 (12.06.2001)</b>
VI-1-2	Number	<b>20011235</b>
VI-1-3	Country	<b>FI</b>
<b>VI-2</b>	<b>Priority document request</b> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	<b>VI-1</b>
<b>VII-1</b>	<b>International Searching Authority Chosen</b>	<b>Swedish Patent Office (ISA/SE)</b>
<b>VIII</b>	<b>Declarations</b>	<b>Number of declarations</b>
VIII-1	Declaration as to the identity of the inventor	-
VIII-2	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	1
VIII-3	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	-
VIII-4	Declaration of inventorship (only for the purposes of the designation of the United States of America)	-
VIII-5	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	-

## PCT REQUEST

2010642PC/ko


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VIII-2-1	<b>Declaration: Entitlement to apply for and be granted a patent</b> Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent (Rules 4.17(ii) and 51bis.1(a)(ii)), in a case where the declaration under Rule 4.17(iv) is not appropriate: Name:	<b>in relation to this international application</b>  <b>SANDVIK TAMROCK OY</b> <b>is entitled to apply for and be granted a patent by virtue of the following:</b>
VIII-2-1 (ii)		<b>SANDVIK TAMROCK OY is entitled as employer of the inventor, MUUTTONEN, Timo</b>
VIII-2-1 (ix)	<b>This declaration is made for the purposes of:</b>	<b>all designations except the designation of the United States of America</b>

## PCT REQUEST

2010642PC/ko

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IX	Ch ck list	number of she ts	electronic file(s) attached
IX-1	Request (including declaration sheets)	5	-
IX-2	Description	10	-
IX-3	Claims	3	-
IX-4	Abstract	1	EZABST00.TXT
IX-5	Drawings	5	-
IX-7	TOTAL	24	
	Accompanying items	paper document(s) attached	electronic file(s) attached
IX-8	Fee calculation sheet	✓	-
IX-9	Original separate power of attorney	✓	-
IX-11	Copy of general power of attorney	reference no. <no.>	-
IX-17	PCT-EASY diskette	-	Diskette
IX-18	Other (specified):	Copy of Official Action	-
IX-19	Figure of the drawings which should accompany the abstract	2	
IX-20	Language of filing of the international application	English	
X-1	Signature of applicant, agent or common representative		
X-1-1	Name	KOLSTER OY AB	

## FOR RECEIVING OFFICE USE ONLY

10-1	Date of actual receipt of the purported international application	11 JUN 2002 (11-06-2002)
10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/SE
10-6	Transmittal of search copy delayed until search fee is paid	

## FOR INTERNATIONAL BUREAU USE ONLY

11-1	Date of receipt of the record copy by the International Bureau	
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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 02/00506

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: E21B 1/38, B25D 9/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: E21B, B25D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9842481 A1 (RAMROCK OY), 1 October 1998 (01.10.98) --	1-10
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☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

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- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

20 Sept 2002

Date of mailing of the international search report

24 -09- 2002

Name and mailing address of the ISA/  
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Facsimile No. +46 8 666 02 86

Authorized officer

Christer Bäcknert / MRo  
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## INTERNATIONAL SEARCH REPORT

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